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JUNG, UNSU	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/814,982	DUBIN ET AL.	
	Examiner	Art Unit	
	UNSU JUNG	1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7-16,19-21 and 41-53* is/are pending in the application.

4a) Of the above claim(s) *5 and 41-53* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-16 and 19-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 August 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendments in the reply filed on May 5, 2008 have been acknowledged and entered. The reply included amendments to claims 1 and 14 and cancellation of claim 18.

Status of Claims

2. Claims 1-5, 7-16, 19-21, and 41-53 are pending, claims 5 and 41-53 have been withdrawn from consideration, and claims 1-4, 7-16, and 19-21 are currently under consideration for patentability under 37 CFR 1.104.

Rejections Withdrawn

3. As a preliminary matter, it has been noted that claims 19-21 have been rejected twice in item 7 (rejection under 35 U.S.C. 103(a) as being unpatentable over Li in view of DeNuzzio et al.) and item 8 (rejection under 35 U.S.C. 103(a) as being unpatentable over Li in view of DeNuzzio et al., Chazalviel et al., and Yoshida et al.) as set forth in the previous Office Action dated February 5, 2008. The former rejection (set forth in item 7) inadvertently included claims 19-21 since Li and DeNuzzio et al. fails to teach all the limitations of independent claim 1 (a waveguide, which includes a total internal reflection prism), from which claims 19-21 depend. Therefore, the rejection of claims 19-21 under 35 U.S.C. 103(a) as being unpatentable over Li (WO 02/031463 A2, Apr. 18, 2002) in

view of DeNuzzio et al. (WO 2004/001404 A1, published on December 31, 2003 and filed on June 19, 2003) has been withdrawn in favor of the rejection of claims 19-21 set forth in item 8.

4. Rejection of claims 14-16 under 35 U.S.C. 103(a) as being unpatentable over Li (WO 02/031463 A2, Apr. 18, 2002) in view of DeNuzzio et al. (WO 2004/001404 A1, published on December 31, 2003 and filed on June 19, 2003) has been withdrawn in view of amended claim 14 in the reply filed on May 5, 2008.

5. Rejection of claims 14-16 under 35 U.S.C. 103(a) as being unpatentable over Li (WO 02/031463 A2, Apr. 18, 2002) in view of DeNuzzio et al. (WO 2004/001404 A1, published on December 31,2003 and filed on June 19, 2003), Chazalviel et al. (Applied Spectroscopy, 1993, Vol. 47, pp1411-1416), and Yoshida et al. (JP 07-184883 A, July 25, 1995) has been withdrawn in view of amended claim 14 in the reply filed on May 5, 2008.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. **The following prior art rejections may include modified portions or new grounds of rejections, which have been bolded, due to amendments of independent claims 1 and 14 in the reply filed on May 5, 2008.**

10. Claims 1-4, 7-12, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li (WO 02/031463 A2, Apr. 18, 2002) in view of DeNuzzio et al. (WO

2004/001404 A1, published on December 31,2003 and filed on June 19, 2003), Chazalviel et al. (*Applied Spectroscopy*, 1993, Vol. 47, pp1411-1416), and Yoshida et al. (JP 07-184883 A, July 25, 1995).

Li teaches an apparatus comprising a condensed array addressed device (see entire document, particularly p8) including a plurality of addressable cells (p8, Detailed Description of the Invention, 1st paragraph), each of the plurality of addressable cells including at least two electrodes (reference elements 1 and 5 in Fig. 2; **reference elements 1 and 3 in Fig.'s 1 and 3; and reference elements 3 and 4 in Fig. 5**); and a spectroscope optically coupled to the condensed array addressed device (p34, last paragraph and p35). **The apparatus of Li further includes microfluidic trench for containing one or more target molecules (reference element 7 in Fig.'s 1 and 3 and p39, 1st paragraph).**

With respect to claims 8 and 9, Li teaches that the plurality of addressable cells includes an individually addressable cell, which includes a first individually addressable electrode and a second individually addressable electrode (p8, Detailed Description of the Invention, 1st paragraph).

With respect to claims 10-12, Li teaches that spacing between the electrodes is less than 1 µm (p17, 5th paragraph). Li further teaches that cross-dimensions of microchannels, in which the electrodes are located, are in the order of 0.1 to 500 µm (p19, 1st paragraph and Fig. 9C). Therefore, one of ordinary skill in the art would recognize that the electrodes located within the microchannels would have less than

100 nm in size since the electrodes contained within the microchannels would necessarily have to be less than the cross-dimensions of microchannels.

With respect to claim 19, Li teaches an apparatus, further comprising a microfluidic channel coupled to at least one of the addressable cells (p18, last paragraph and p19, 1st paragraph).

With respect to claims 20 and 21, Li teaches an apparatus, further comprising selective membranes (porous polymeric pads), which includes chemically and biologically selective membranes (p5, last paragraph).

Li further teaches that a variety of detection methods can be used with the condensed array addressed device including optical detection methods capable of detecting spectral changes upon changes in redox state including fluorescence, phosphorescence, luminescence, chemiluminescence, electrochemiluminescence, and refractive index detection methods. However, Li does not specifically teach that two different detection means, electrochemical and optical (spectroscope), are coupled to the array device. Li further does not specifically teach an apparatus further comprising a waveguide, which includes a total internal reflection prism, wherein the spectroscope is optically coupled to the total internal reflection prism.

DeNuzzio et al. teaches microfabricated sensors with multiple working electrodes coupled to both optical and electrochemical detection means allowing the combination of the multiplexed electrochemical detection with optical detection in a single planar microcell (see entire document, particularly Abstract and p5, paragraph [0014]). The combination of various electrochemical, photometric, and other measurement results in

a powerful analytical tool capable of measuring multiple properties of an analyte, as well as properties of multiple analytes simultaneously (p9, paragraph 0030]).

With respect to claims 1-3, Chazalviel et al. teaches Fourier Transform (FT)-infrared (IR) spectroscopy, which is a well-known spectral detection method at the electrochemical interfaces (entire document, particularly p1416, *Conclusion*). The advantages of FT-IR spectroscopy are well known (p1416, *Conclusion*). The advantages include good sensitivity and ability to smoothly extract varying contributions due to electronic absorptions and to obtain spectra as complex quantities, which is of considerable help in the identification of the vibration signals and in their ascription to one or the other of the many possible electrochemical processes (p 1416, *Conclusion*).

With respect to claims 1 and 7, Yoshida et al. teaches an optical system comprising FT-IR spectroscopy and an ATR (attenuated total internal reflection) prism, which provides infrared rays to infrared analysis equipment such as FT-IR spectroscopy (see entire translated document, particularly Abstract and paragraph [0005]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ combination of both optical and electrochemical detectors of Li as taught by DeNuzzio et al. in order to allow a combination of multiplexed electrochemical detection with optical detection in a single device. The advantage of allowing a combination of multiplexed electrochemical detection with optical detection in a single device provides the motivation to combine teachings of Li and DeNuzzio et al. since the combination of various electrochemical, photometric, and other measurement results in a powerful analytical tool capable of measuring multiple

properties of an analyte, as well as properties of multiple analytes simultaneously. Further, one of ordinary skill in the art would have had a reasonable expectation of success in employing the combination of both optical and electrochemical detectors in the device of Li since DeNuzzio et al. teaches that simultaneous detection of both optical and electrochemical signals is possible with the combination of the multiplexed electrochemical detection with optical detection. Further, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the FT-IR spectroscopy of Chazalviel et al. in the apparatus of Li in order to provide a spectral detection device at the electrochemical interfaces of the condensed array addressed device of Li for optical detection of biomoleclular interactions. The advantage of employing a sensitive detection device, which facilitates spectra information in complex quantities, provides the motivation to employ the FT-IR spectroscopy of Chazalviel et al. in the apparatus of Li with a reasonable expectation of success since the FT-IR spectroscopy is capable of smoothly extracting varying contributions due to electronic absorptions and obtaining spectra in complex quantities permitting identification of the vibration signals. In addition, it would have been obvious to one of ordinary skill in the art at the time of the invention to select FT-IR spectroscopy as a detection system, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of design choice. *In re Leshin*, 125 USPQ 416. Because the claimed apparatus is known in the prior art and has been disclosed as being used with a spectroscope in general, the selection of a specific type of a spectroscope in itself does not present a novel feature of

the claimed invention. Since one of ordinary skill in the art at the time of the invention would recognize that a plurality of different types of detection system can be used in the apparatus of Li for detection of biomolecular interactions based on the same principle of detecting electrochemical species, it would have been obvious to employ a FT-IR spectroscopy as a detection system in the instant claims. Further, it would have been obvious to further include a total internal reflection prism (waveguide), which is optically coupled to the FT-IR spectroscope as taught by Yoshida et al. in the apparatus of Li in view of Chazalviel et al. as it is generally known to use total internal reflection prisms in order to provide infrared rays to FT-IR spectroscope. **Since the FT-IR spectroscopy of Yoshida et al. can be coupled to the electrochemical interfaces of the condensed array addressed device of Li as set forth above and the electrochemical interfaces of Li includes a microfluidic trench containing addressable cells having at least two electrodes, the combined teachings of Li, DeNuzzio et al., Chazalviel et al. and Yoshida et al. meet the amended feature of "the waveguide total internal reflection prism is coupled to the microfluidic trench."**

With respect to claim 4, the limitation of "the infrared spectroscope is electromodulated by applying potential between the at least two electrodes in at least one of the plurality of cells" is a recitation of the intended use of the claimed invention and must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. The

apparatus of Li in view of DeNuzzio et al., Chazalviel et al., and Yoshida et al. meets all the structural limitation of claim 4 and would therefore be capable of performing the intended use limitation above. Further, Li teaches that a potential is applied between the two electrodes in the plurality of cells (p34, 4m paragraph).

11. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (WO 02/031463 A2, Apr. 18, 2002) in view of DeNuzzio et al. (WO 2004/001404 A1, published on December 31, 2003 and filed on June 19, 2003), Chazalviel et al. (Applied Spectroscopy, 1993, Vol. 47, pp1411-1416), and Yoshida et al. (JP 07-184883 A, July 25, 1995) as applied to claims 1 and 10 above, and further in view of Dai et al. (U.S. Patent No. 6,528,020, Mar. 4, 2003).

Li in view of DeNuzzio et al., Chazalviel et al., and Yoshida et al. teaches an apparatus comprising a condensed-array addressed device and an optically coupled spectroscope as set forth in item 8 above. Li further teaches that each of the pair of electrodes includes carbon nanotubes (p23, 3rd paragraph). However, Li in view of DeNuzzio et al., Chazalviel et al., and Yoshida et al. does not specifically teach that each of the pair of electrodes includes single-walled carbon nanotubes or silicon nanowires.

Dai et al. teaches chemical/biological sensors comprising electrochemical nanotube devices, which demonstrate significant and robust response and more significantly tunable selectivity to chemical or biological species in their environments

(see entire document). The nanotube is generally single-walled carbon nanotube or silicon nanotubes (nanowires, column 2, lines 21-27 and column 4, lines 17-22).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to specifically employ single-walled carbon nanotubes or silicon nanowires of Dai et al. as the nanotubes associated with the pair of electrodes of Li in view of DeNuzzio et al., Chazalviel et al., and Yoshida et al., as it is well known that the electrochemical nanotube devices demonstrate significant and robust response and more significantly tunable selectivity to chemical or biological species in their environments. In addition, it would have been obvious to one of ordinary skill in the art at the time of the invention to select single-walled carbon nanotubes or silicon nanowires as a layer covering the electrodes of the condensed array addressed device, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of design choice. *In re Leshin*, 125 USPQ 416. Because the claimed apparatus is known in the prior art and has been disclosed as being capable of being used with carbon nanotubes in general, the selection of a specific type of a nanotube/nanowire in itself does not present a novel feature of the claimed invention. Since one of ordinary skill in the art at the time of the invention would recognize that a plurality of different types of nanotubes/nanowires can be used in the apparatus of Li in view of DeNuzzio et al., Chazalviel et al., and Yoshida et al. for detection of biomolecular interactions based on the same principle of detecting electrochemical species, it would have been obvious to employ a single-walled carbon nanotubes or silicon nanowires in the instant claims.

12. **Claim 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li (WO 02/031463 A2, Apr. 18, 2002) in view of DeNuzzio et al. (WO 2004/001404 A1, published on December 31, 2003 and filed on June 19, 2003), Ito (U.S. Patent No. 5,384,028, Jan. 24, 1995), and Girault et al. (U.S. Patent No. 5,512,489, Apr. 30, 1996).**

Li teaches an apparatus comprising a condensed array addressed device (see entire document, particularly p8) including a plurality of addressable cells (p8, Detailed Description of the Invention, 1st paragraph), each of the plurality of addressable cells including at least two electrodes (reference elements 1 and 5 in Fig. 2; reference elements 1 and 3 in Fig.'s 1 and 3; and reference elements 3 and 4 in Fig. 5); and a spectroscope optically coupled to the condensed array addressed device (p34, last paragraph and p35). The apparatus of Li further includes microfluidic trench for containing one or more target molecules (reference element 7 in Fig.'s 1 and 3 and p39, 1st paragraph).

With respect to claim 14, Li teaches that the plurality of addressable cells define a plurality of sensor elements configured as an array, wherein each of the sensor elements is functionalized to interact with one or more target molecules (p23, 2nd -7th paragraphs); and further comprising control circuitry coupled to the sensor elements, wherein the control circuitry is configured to detect interactions of the sensors with the target molecules (p24, 4th paragraph). The addressable cells of Li contain a first electrode and a second electrode (reference elements 1

and 3 in Fig.'s 1 and 3; and reference elements 3 and 4 in Fig. 5), wherein the first tip of the first electrode and the second tip of the second electrode are located in the microfluidic trench (Fig.'s 1 and 3). The first electrode and the second electrode are each coupled to first and second traces (input and outputs) via first and second conductive plugs, respectively (Fig. 5 and p17, 2nd paragraph).

With respect to claims 15 and 16, Li teaches the plurality of sensor elements configured as a two-dimensional high-density array (p39, 3rd paragraph), which are addressable by corresponding rows and columns.

Li further teaches that a variety of detection methods can be used with the condensed array addressed device including optical detection methods capable of detecting spectral changes upon changes in redox state including fluorescence, phosphorescence, luminescence, chemiluminescence, electrochemiluminescence, and refractive index detection methods. However, Li does not specifically teach that two different detection means, electrochemical and optical (spectroscope) detectors are coupled to the array device. Li further teaches that other electronic components can be added to the apparatus including circuitry that allows signal processing (p24, 4th paragraph). However, Li is silent on an apparatus further comprising memory coupled to the control plurality of sensor elements in the memory. The apparatus of Li includes an array addressed device in a microarray format as set forth above. Although the microarray format of Li would allow the apparatus of Li to be hand-held, Li fails to explicitly teach that the apparatus is a hand-held device.

DeNuzzio et al. teaches microfabricated sensors with multiple working electrodes coupled to both optical and electrochemical detection means allowing the combination of the multiplexed electrochemical detection with optical detection in a single planar microcell (see entire document, particularly Abstract and p5, paragraph [0014]). The combination of various electrochemical, photometric, and other measurements results in a powerful analytical tool capable of measuring multiple properties of an analyte, as well as properties of multiple analytes simultaneously (p9, paragraph 0030]).

Ito teaches that a memory device for storing data can be provided with a biosensor for storing data (see entire document, particularly Abstract). The data include a fabrication date for the biosensor, a lot number, an effective period of the biosensor, biosensor characteristics, measured date, measuring time, and measured results (Abstract).

Girault et al. teaches a device which need not be laboratory bound (see entire document, particularly column 3, lines 52-57). The device is a multi-heavy metal ion detector directed essentially at in-the-field measurement which may be used as a portable hand-held device or form part of a remote sensing network (column 3, lines 52-57). The device of Girault et al. electroanalysis can be easily adapted to enzyme chemistry or/and immunochemistry for use as a biosensor (column 7, lines 12-20).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ a combination of both optical and

electrochemical detectors of Li as taught by DeNuzzio et al. in order to allow a combination of multiplexed electrochemical detection with optical detection in a single device. The advantage of allowing a combination of multiplexed electrochemical detection with optical detection in a single device provides the motivation to combine teachings of Li and DeNuzzio et al. since the combination of various electrochemical, photometric, and other measurement results in a powerful analytical tool capable of measuring multiple properties of an analyte, as well as properties of multiple analytes simultaneously. Further, one of ordinary skill in the art would have had a reasonable expectation of success in employing the combination of both optical and electrochemical detectors in the device of Li since DeNuzzio et al. teaches that simultaneous detection of both optical and electrochemical signals is possible with the combination of the multiplexed electrochemical detection with optical detection. In addition, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the memory device of Ito, which is configured to store data, coupled to the control circuit of Li in view of DeNuzzio et al. in order to store data associated with plurality of sensor elements. The advantage of storing data, which may include a fabrication date for the biosensor, a lot number, an effective period of the biosensor, the biosensor characteristics, measured date, the measuring time, and the measured results, provides the motivation to include the memory device of Ito coupled to the control circuit of Li in view of DeNuzzio et al. with a reasonable expectation of success. Although Li in view of DeNuzzio et al. and Ito

fails to explicitly teach that the apparatus is a hand-held device, one of ordinary skill in the art at the time of the invention would have been motivated to construct the apparatus of Li in view of DeNuzzio et al. and Ito in a hand-held device format with a reasonable expectation of success since Girault et al. teaches that electrode array biosensor devices can be used as a portable hand-held device, which need not be laboratory bound and has the advantage of allowing in-the-field measurements.

Response to Arguments

13. Rejection of claims 1-4, 7-12, and 19-21 under 35 U.S.C. 103(a) as being unpatentable over Li in view of DeNuzzio et al., Chazalviel et al., and Yoshida et al.

Applicant's arguments filed on May 5, 2008 have been fully considered but they are not persuasive essentially for the reasons of record.

Specifically, applicant's argument that the teachings of Li in view of DeNuzzio et al., Chazalviel et al., and Yoshida et al. fails to teach the amended feature (the waveguide total internal reflection prism is coupled to the microfluidic trench) of the independent claim 11 has been fully considered, but is not found persuasive. As set forth above, Li teaches an apparatus comprising a condensed array addressed device including a plurality of addressable cells and microfluidic trench for containing one or more target molecules. Although Li does not specifically teach that two different detection means, electrochemical and optical (spectroscope), are coupled to the array device, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ a combination of both optical and electrochemical detectors of Li as

taught by DeNuzzio et al. in order to allow combination of multiplexed electrochemical detection with optical detection in a single device. The advantage of allowing a combination of multiplexed electrochemical detection with optical detection in a single device provides the motivation to combine teachings of Li and DeNuzzio et al., since the combination of various electrochemical, photometric, and other measurement results in a powerful analytical tool capable of measuring multiple properties of an analyte, as well as properties of multiple analytes simultaneously. Although Li further does not specifically teach an apparatus further comprising a waveguide, which includes a total internal reflection prism, wherein the spectroscope is optically coupled to the total internal reflection prism, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the FT-IR spectroscopy of Chazalviel et al. in the apparatus of Li in view of DeNuzzio et al. in order to provide a spectral detection device at the electrochemical interfaces of the condensed array addressed device of Li for optical detection of biomoleclular interactions. The advantage of employing a sensitive detection device, which facilitates spectra information in complex quantities, provides the motivation to employ the FT-IR spectroscopy of Chazalviel et al. in the apparatus of Li with a reasonable expectation of success since the FT-IR spectroscopy is capable of smoothly extracting varying contributions due to electronic absorptions and obtaining spectra in complex quantities permitting identification of the vibration signals. Finally, it would have been obvious to one of ordinary skill in the art at the time of the invention to select FT-IR spectroscopy as a detection system, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability

for the intended use as a matter of design choice. *In re Leshin*, 125 USPQ 416. Because the claimed apparatus is known in the prior art and has been disclosed as being used with a spectroscope in general, the selection of a specific type of a spectroscope in itself does not present a novel feature of the claimed invention. Since one of ordinary skill in the art at the time of the invention would recognize that a plurality of different types of detection systems can be used in the apparatus of Li for detection of biomolecular interactions based on the same principle of detecting electrochemical species, it would have been obvious to employ a FT-IR spectroscopy as a detection system in the instant claims. Further, it would have been obvious to further include a total internal reflection prism (waveguide), which is optically coupled to the FT-IR spectroscope as taught by Yoshida et al. in the apparatus of Li in view of Chazalviel et al. as it is generally known to use total internal reflection prisms in order to provide infrared rays to FT-IR spectroscope. Since the FT-IR spectroscopy of Yoshida et al. can be coupled to the electrochemical interfaces of the condensed array addressed device of Li as set forth above and the electrochemical interfaces of Li include a microfluidic trench containing addressable cells having at least two electrodes, the combined teachings of Li, DeNuzzio et al., Chazalviel et al. and Yoshida et al. meet the amended feature of “the waveguide total internal reflection prism is coupled to the microfluidic trench.”

In view of the foregoing, the rejection of claims 1-4, 7-12, and 19-21 under 35 U.S.C. 103(a) as being unpatentable over Li in view of DeNuzzio et al., Chazalviel et al., and Yoshida et al. has been maintained.

14. <u>Rejection of claim 13 under 35 U.S.C. 103(a) as being unpatentable over DeNuzzio et al., Chazalviel et al., and Yoshida et al., and further in view of Dai et al.</u>

Applicant's arguments filed on May 5, 2008 have been fully considered but they are not persuasive essentially for the reasons of record and arguments addressed above.

In view of the foregoing, the rejection of claim 13 under 35 U.S.C. 103(a) as being unpatentable over Li in view of DeNuzzio et al., Chazalviel et al., and Yoshida et al., and further in view of Dai et al. has been maintained.

15. <u>Rejection of claim 14-16 under 35 U.S.C. 103(a) as being unpatentable over Li in view of DeNuzzio et al., Ito, and Girault et al.</u>

Applicant's arguments with respect to claims 14-16 have been considered but are moot in view of the new ground(s) of rejection.

16. Since the prior art fulfills all the limitations currently recited in the claims, the invention as currently recited would read upon the prior art.

Conclusion

17. No claim is allowed.

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to UNSU JUNG whose telephone number is (571)272-8506. The examiner can normally be reached on M-F: 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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